

Remarks/Arguments

Claims 2-7 and 10-20 remain in this application.

The examiner has stated that the title is not descriptive.

The examiner has rejected claims 1-4, 8, 9 and 16 under 35 USC 102(e) as being anticipated by *Tsuji* (6,906,794).

The examiner has rejected claims 5-7, 10-15 and 17-20 under 35 USC 103(a) as being unpatentable over *Tsuji*.

In view of these remarks and the above amendments, reconsideration of the above noted rejections and objections is respectfully requested.

Title:

The title "Wafer Edge Defect Inspection" has been amended to "Wafer Edge Defect Inspection Using Captured Image Analysis" as required by the office action.

Rejections under 35 USC 102(e) and 103(a):

Applicant respectfully traverses the rejection of **claims 2-4 and 16** under 35 USC 102(e) as being anticipated by *Tsuji* and the rejection of **claims 5-7, 10-15 and 17-20** under 35 USC 103(a) as being unpatentable over *Tsuji*. Since these two grounds of rejection are based on the same reference, they will be treated here together. **Claims 1, 8 and 9** stand rejected under 35 USC 102(e) as being anticipated by *Tsuji*, but have been canceled by the above amendments. Additionally, **claims 2, 4, 6 and 7** previously depended from claim 1, but have been amended into independent form including all of the limitations of the base claim. **Claims 6 and 7** have been further amended herein. Thus, the independent claims under these rejections are **claims 2, 4, 6, 7, 10, 13 and 16**, which will be discussed first.

Claims 6 and 7:

Independent **claim 6** recites:

comparing the defect information recorded after the first process step to the defect information recorded after the second process step; and
identifying any new defects as **added defects** due to the second process step.

Independent **claim 7** recites:

comparing the defect information recorded after the first process step to the defect information recorded after the second process step ;
determining whether any defects identified after the first process step have been **reduced** after the second process step; and
identifying any such reduced defects as **repaired defects**.

(Amendments to these limitations are supported in the Specification at page 3, lines 27-29; and at page 5, line 27 to page 6, line 13.) Applicant respectfully submits that *Tsuji* does not teach or suggest these limitations. The office action states that “repeatedly inspecting the same area or portion of an inspected object or wafer for ensuring a complete inspection performance would have been obvious to one of ordinary skill in the inspection art.” Applicant respectfully submits, however, that whereas an “inspection” may imply a review of the results of the inspection and whereas a “repeated inspection” may imply a review of the new results, there is **no** necessary implication or suggestion that the two results will be **compared** to each other. **Additionally**, such repeated inspection and review of results cannot imply or suggest that any “**added defects**” or “**repaired defects**” will necessarily be **identified** during the subsequent review of results. Applicant respectfully submits, therefore, that independent **claims 6 and 7** are not anticipated by, are not obvious in view of, and are patentable over *Tsuji* at least because the reference does not teach or fairly suggest **comparing** defect information and/or **identifying** any new defects as **added defects** or reduced defects as **repaired defects**.

Claim 13:

Independent **claim 13** recites:

correlating each recorded image with the wafer from which it was taken and **the process step after which it was taken.**

Applicant respectfully submits that *Tsuji* does not teach or suggest these limitations. Instead, *Tsuji* appears to disclose only that image data, related defect data, "the coordinates and the rotating angle of a portion [of the wafer] being observed," and a wafer identification number may be correlated. (See column 6, lines 62-65; column 7, lines 1-6 and 54-56; column 11, lines 34-42.) *Tsuji* does not appear to disclose, however, that this information is correlated with the **process step** after which the recorded image was taken. Applicant respectfully submits, therefore, that independent **claim 13** is not anticipated by, is not obvious in view of, and is patentable over *Tsuji* at least because the reference does not teach or fairly suggest that each recorded image is correlated with the **process step after which it was taken.**

Claim 2:

Independent **claim 2** recites:

positioning the wafer with an edge thereof relative to a **scanning electron microscope;**

...

scanning the edge of the rotating wafer with the **scanning electron microscope;**

recording an image of the scanned wafer from the **scanning electron microscope** into a database

...

Applicant respectfully submits that *Tsuji* does not teach or suggest these limitations. Instead, *Tsuji* appears to disclose only an optical image capturing device. (See column 4, lines 23-26; column 6, lines 39-50 and 54-61.) A scanning electron microscope is not an optical device. Applicant respectfully submits, therefore, that independent **claim 2** is not anticipated by, is not obvious in view of, and is patentable over *Tsuji* at least because the reference does not teach or fairly suggest the use of a scanning electron microscope as claimed.

Claim 4:

Independent **claim 4** recites:

positioning the image capturing device at a desired angle relative to the edge of the wafer.

Applicant respectfully submits that *Tsuji* does not teach or suggest these limitations. Instead, *Tsuji* does not appear to disclose that the imaging device 100 and the objective lens 60 can be "positioned." Therefore, it appears that the angle of the imaging device is **fixed**. Applicant respectfully submits, therefore, that independent **claim 4** is not anticipated by, is not obvious in view of, and is patentable over *Tsuji* at least because the reference does not teach or fairly suggest **positioning** the image capturing device at a desired angle.

Claims 10 and 16:

Independent **claim 10** recites:

automatically inspecting an edge of the wafer in a first inspection station;
automatically recording a first set of defects in the edge of the wafer;
...
automatically inspecting the edge of the wafer in a second inspection station; and
automatically recording a second set of defects in the edge of the wafer.

Independent **claim 16** recites:

an image capturing device ..., the image capturing device **automatically** generating an image of the edge of the wafer;
a database ..., the database **automatically** storing the received image for subsequent analysis.

Applicant respectfully submits that *Tsuji* does not teach or suggest these limitations. Instead, *Tsuji* appears to disclose that the edge inspection is **manual**, rather than **automatic**, since a user must use the joy stick pointing device 50 to control the position and rotation of the table 21 on which the wafer 2 is placed. (See column 4,

lines 41-55; and Fig. 2.) Applicant respectfully submits, therefore, that independent **claims 10 and 16** are not anticipated by, are not obvious in view of, and are patentable over *Tsuji* at least because the reference does not teach or fairly suggest **automatic** inspection and recording of sets of defects or **automatic** generating and storing of an image.

Dependent Claims:

Claims 3, 5, 11, 12, 14, 15 and 17-20 depend either directly or indirectly from independent claims 2, 4, 10, 13 or 16. Applicant respectfully submits, therefore, that **claims 3, 5, 11, 12, 14, 15 and 17-20** are also not anticipated by, are not obvious in view of, and are patentable over *Tsuji* at least for the same reasons.

Dependent Claim 3:

Dependent **claim 3** recites:

setting an angle of the image capturing device relative to the edge of the wafer, **a brightness of an illumination source** that illuminates the edge of the wafer, and **an accelerating voltage of an electron beam**.

Applicant respectfully submits that *Tsuji* does not teach or suggest these limitations. Instead, whereas *Tsuji* appears to disclose that some parameters can be set, *Tsuji* does not appear to disclose that the claimed parameters in claim 3 can be set. Applicant respectfully submits, therefore, that in addition to the above arguments, dependent **claim 3** is not anticipated by, is not obvious in view of, and is patentable over *Tsuji* at least because the reference does not teach or fairly suggest **setting** these parameters.

Dependent Claims 11 and 12:

Dependent **claim 11** recites:

determining a difference between the first and second sets of defects.

Dependent **claim 12** recites:

identifying process-induced edge defects from the determined difference between the first and second sets of defects.

Applicant respectfully submits that *Tsuji* does not teach or suggest this limitation. Instead, similar to the arguments above regarding independent claims 6 and 7, although repeated inspections may imply a review of each new set of results, there is no necessary implication or suggestion that the review of the results will **determine a difference** between the results and/or **identify process-induced edge defects** therefrom. Applicant respectfully submits, therefore, that in addition to the above arguments, dependent **claims 11 and 12** are not anticipated by, are not obvious in view of, and are patentable over *Tsuji* at least because the reference does not teach or fairly suggest **determining a difference** between sets of defects and/or **identifying process-induced edge defects** from the determined difference.

Dependent Claims 14 and 15:

Dependent **claim 14** recites:

selecting a recorded image ... by specifying ... the process step after which it was taken.

Dependent **claim 15** recites:

selecting two recorded images ... by specifying ... the two process steps after which each selected image was taken;
... and
determining whether any defects were added to the edge of the specified wafer ...

Applicant respectfully submits that *Tsuji* does not teach or suggest these limitations. Instead, since *Tsuji* does not appear to disclose that any information is correlated with the **process step** after which the recorded image was taken (see arguments above regarding claim 13), *Tsuji* also does not appear to disclose that a recorded image can be **selected by specifying** the process step. Additionally, similar to the arguments above regarding independent claims 6 and 7, although repeated inspections may imply a review of each new set of results, there is no necessary implication or suggestion that the review of the results will determine whether any

defects were added. Applicant respectfully submits, therefore, that in addition to the above arguments, dependent **claims 14 and 15** are not anticipated by, are not obvious in view of, and are patentable over *Tsuji* at least because the reference does not teach or fairly suggest that a recorded image can be **selected by specifying** the process step after which it was taken. Additionally, Applicant respectfully submits that in addition to the above arguments, dependent **claim 15** further is not anticipated by, is not obvious in view of, and is patentable over *Tsuji* at least because the reference does not teach or fairly suggest determining whether any **defects were added** to the edge of the specified wafer.

Dependent Claims 18 and 19:

Dependent **claim 18** recites:

the computer compares and analyzes the first and second images together ... to determine **whether any defects have been added** to the edge of the wafer between times that the first and second images thereof are generated.

Dependent **claim 19** recites:

the computer compares and analyzes the first and second images together ... to determine **whether any defects have been repaired** on the edge of the wafer between times that the first and second images thereof are generated.

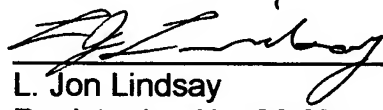
Applicant respectfully submits that *Tsuji* does not teach or suggest these limitations. Similar to the arguments above regarding independent claims 6 and 7, although repeated inspections may imply a review of each new set of results, there is no necessary implication or suggestion that the review of the results will determine whether any **defects were added or repaired**. Applicant respectfully submits, therefore, that in addition to the above arguments, dependent **claims 18 and 19** are not anticipated by, are not obvious in view of, and are patentable over *Tsuji* at least because the reference does not teach or fairly suggest that it can be determined whether any **defects were added to or repaired on** the edge of the wafer between times that first and second images thereof are generated.

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For the reasons specifically discussed above, and others, it is believed that claims 2-7 and 10-20 define patentable subject matter. Reconsideration of the previous rejections as they might apply to these claims is therefore respectfully requested. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

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Date

Respectfully submitted,



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